REMARKS

The Office Action October 8, 2003 was received and carefully reviewed. Accordingly, the Applicant has amended claims 2, 5, 9, 12, 16 and 19 to recite a sputtering atmosphere which includes "nitrogen at 75 volume % or more" and further amended claims 8, 15 and 22 to recite that the sputtering atmosphere further includes "halogen at 0.2 to 20 volume %." Each of these newly added features is disclosed in the specification at least at page 3-line 19, to page 4-line 7. Therefore, claims 2-22 remain pending. In view of the above amendments and the following remarks, reconsideration of this application is respectfully requested.

Initially, it is noted that the Applicant filed on July 20, 2000 an information disclosure statement (IDS) citing the prior art documents previously cited in parent Applications Nos. 08/857,556 (USP 6,144,057), 08/250,344 (USP 5,665,210), 08/041,520 (abandoned) and 07/729,533 (abandoned). According to the MPEP Chapter 609 (I)(2), the Examiner must consider each of the those references in the parent applications and the information regarding those reference "need not be resubmitted in the continuing application unless the applicant desires the information to be printed on the patent." Since the Applicant has provided that information regarding those references cited in the parent applications on a PTO-1449 form submitted with the July 20, 2000 IDS (and again with the Request letter of October 17, 2003), the Examiner must retrieve and review each reference cited in the parent applications and indicate such consideration by initialing each reference on the PTO-1449 form provided previously. Please note that according to the USPTO PAIR (and IFW) record available to the Applicant, each of the IDS of July 20, 2003 and the Request of October 17, 2003 are of record and present in the application file.

With regard to the rejections of:

Claims 2, 3, 5, 6, 9, 10, 12, 13, 16, 17, 19 and 20, under 35 U.S.C. §102(b), as being anticipated by the teachings of Cunningham et al. ('842),

Claims 8, 15, 22, under 35 U.S.C. §103(a) as unpatentable over the teachings of Cunningham et al. ('842), and

> Claims 7, 11, 14, 18 and 21, under 35 U.S.C. §103(a) as unpatentable over the combination of teachings of Cunningham et al. ('842) and Nomoto et al. ('364),

each of these rejections is respectfully traversed.

The Examiner asserts that Cunningham et al. (column 12, lines 5-12) teach "forming an insulating layer 119 comprising silicon nitride over a semiconductor substrate 70 by sputtering in an atmosphere consisting of nitrogen." However, a careful review of the Cunningham et al. reference, particularly the asserted passage by the Examiner reveals that the patent contains no such teaching. Specifically, the relevant portions of Cunningham et al. state:

> **An insulating layer 119 of silicon oxide, for example, is deposited by any suitable technique, for example, evaporation or sputtering, on the tungsten layer 118 and then selectively etched to expose the surface of the tungsten layer 118 solely at the terminal point V, as depicted in FIG. 12. The purpose of the insulating layer 119 is to electrically isolate the first level metal interconnections, such as 104, from the second level metal interconnections which are to be subsequently formed. Accordingly, the layer 119 may be formed of other inorganic materials such as silicon nitride, aluminum oxide, or various organic insulating materials. In this particular example, the insulating layer 119 is silicon oxide, deposited by *rf*-sputtering to a thickness of about 20,000 A. For better ohmic contact between the two levels of interconnectors, the portion of the tungsten layer 118 exposed by the opening in the insulating layer 119 at V is removed by photosensitive etching techniques so that contact can be made directly to the gold layer 117.** **(underline added)**

As can be seen, Cunningham et al is completely silent about forming a silicon nitride by sputter deposition in an atmosphere comprising nitrogen, let alone nitrogen at 75 volume% or more as presently claimed. Additionally, it is further pointed out that the patentees are only exemplary in depositing silicon dioxide (SiO_2) by sputtering, but again the patentees make no mention of carrying out the process by using an atmosphere containing oxygen. In fact, the conventional manner of sputter deposition of insulators (such as silicon dioxide or silicon nitride) on semiconductor devices is through the use of a target of silicon dioxide which during sputtering will result in SiO_2 particles being removed from the

target and deposited onto the semiconductor substrate. See, for example, USP 4,238,312 which teaches a method and apparatus for depositing SiO_2 (quartz) onto semiconductor wafers by a sputtering method using an inert gas (Ar) and a quartz (SiO_2) target as a source of SiO_2. See also, USP 4,036,723 which also teaches a method and apparatus for depositing SiO_2 (or Si_3N_4) onto semiconductor wafers by a sputtering method using an inert gas (Ar) and a target of SiO_2 or Si_3N_4.

Further, it was not until much later that reactive sputter deposition was developed for depositing silicon nitride films. For example, see USP 4,386,933 which teaches employing a silicon target 7 in a magnetron sputtering apparatus 1 in which both Ar and N are introduced to cause the Ar^+ ions to bombard the silicon target 7 causing ejection of Si particles from the target which react with the nitrogen radicals to generate a reactive gas environment for deposition of silicon nitride films onto the silicon substrate 4. Such a process does not teach the specific percentages of nitrogen and argon as presently claimed.

Please note that each of the above references USP 4,238,312, USP 4,036,723 and USP 4,386,933 are presented under the guidelines of MPEP Chapter 609 (III)(C)(3) and are therefore not required to meet the requirements of 37 C.F.R. 1.97-1.98. However, for the Examiner's convenience in considering each reference a PTO-1449 form listing those references is attached.

A review of the secondary reference to Nomoto et al., cited to teach the use of a semiconductor device, like that of Cunningham et al., in a matrix display device, reveals that Nomoto et al. set forth no teaching which remedies the utter failure of Cunningham et al. to teach or suggest each and every feature of the claimed invention.

Since Cunningham et al. make no mention of depositing silicon nitride by sputtering utilizing a nitrogen containing gas (at a volume % of 75 or more) and since the Examiner has cited no reference with teaches or suggests that the process of Cunningham et al. can be modified to employ either 1) a nitrogen gas (at $\geq$ 75 vol%), or 2) a nitrogen gas (at $\geq$ 75 vol%) and inert gas (at $\leq$ 25 vol%), environment to sputter deposit silicon nitride onto a semiconductor substrate,

neither anticipation or a *prima facie* case of obviousness has been set forth by the §102(b) and §103(a) rejections of record. Accordingly, the Applicant respectfully requests withdrawal of each of those rejections.

In view of the foregoing, it is respectfully requested that the pending rejections of record be reconsidered and withdrawn, that claims 2-22 be allowed and that the application be passed to issue. If a conference would be beneficial to expedite prosecution of the instant application, the Examiner is invited to telephone the undersigned to arrange such a conference.

Lastly, it is noted that a separate Extension of Time Petition (one month) accompanies this response along with an authorization to charge the requisite extension of time fee to Deposit Account No. 19-2380 (740756-2183). However, should that petition become separated from this Amendment, then this Amendment should be construed as containing such a petition. Likewise, any overage or shortage in the required payment should be applied to Deposit Account No. 19-2380 (740756-2183).

Respectfully submitted,

By: _____
Jeffrey L. Costellia
Registration No. 35,483

NIXON PEABODY LLP
401 9th Street, N.W., Suite 900
Washington, DC 20004-2128

Office: (202) 585-8000
Facsimile: (202) 585-8080

JLC/JWM